

## **2004 Northeast IPM Project Progress Report**

### A. Grant Data

Grant number: (Award number, 2004-34103-14440)

Title: **Assessment of efficacy and cost of banker plants for aphid control in spring flower crops**

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States Involved: MA and NY

Years funds: two (August 1, 2004-July 31, 2006)

Funding Amount: \$40,453

### B. Nontechnical Summary

Spring flower crops in the northeastern United States contribute about 0.5 billion dollars annually to the economy, as bedding plants or hanging pots. Pests include whiteflies, thrips, aphids and mites. We have developed effective, cost competitive biological controls for whiteflies in flower crops and are mid way toward doing the same for thrips. Aphids commonly appear in crops under biological control management. Non chemical controls for aphids are needed if growers are to be able to employ whitefly and thrips biological control. Aphids make flowers unsightly and unsaleable. Aphid biological control options in greenhouse vegetables are well understood and in use. Application to flower crops has lagged. Greenhouse production in the northeastern US is over 90% flower production. One approach to aphid biological control is to place "banker plants" in greenhouses. These consist of some form of monocot (like rye), with a grain aphid (a species unable to feed on dicot flower crops) on which a commonly used aphid parasitoid (such as *Aphidius colemani*) can reproduce. This allows the parasitoid to develop its population at the earliest moment when pest aphids appear in the crop. This is important as aphid reproduction is very rapid and early stages of aphid infestation are often missed by growers. To adapt the banker plant technology currently in use in Europe and Canada on vegetable crops to flowers we need to run greenhouse trials in flowers crops to see how well it works and at what cost. The dominant aphids in flower crops are likely to cotton aphid (*Aphis gossypii*) and greenpeach aphid (*Myzus persicae*). We will run the needed trials in University greenhouses in MA and then in commercial greenhouses in both MA and NY. Controls that work in these states will work for the whole NE region. Ancillary activities needed in support of these trials include an initial aphid survey in the crop and screening potentially selective aphicides to find a compound to use for spot treating infestations of less common aphids, of species not susceptible to *A. colemani*.

### C. Introduction

Regional importance of spring flower crops. Nationwide, in 1998 sales of flats, pots and hanging baskets of such plants as marigolds, impatiens, geranium, petunias, and cyclamen were approximately 2.5 billion dollars, which was 64% of all greenhouse floriculture sales (National Agricultural Statistical Service, 1999). The majority of these sales are concentrated in the spring crop. In 1998 in MA, CT, NY, NJ, MD, PA, and VA combined, there were over a half a billion

dollars in sales of such floral crops, 20% of all U.S. production. Greenhouse businesses employ a large labor force, averaging 16 employees per business. Thus the 446 greenhouse operations in MA in 2001 (New England Agricultural Statistics Service, 2002) and the ca. 965 operations in NY, likely generated over 20,000 jobs.

Regional importance of pest. Aphids (especially *Aphis gossypii* and *Myzus persicae*) are a common problem on a wide variety of spring floral crops. In a survey of MA flower growers in 1996, growers reported applying an average of three pesticide applications per crop for aphids, second only to thrips (Smith, 1998). While this survey has not been repeated recently, little has changed in this regard. Failure to control aphids to low levels makes plants unsaleable. Use of pesticides for control of aphids can disrupt biological control of thrips, mites and whiteflies. For growers wishing to minimize pesticide use, aphid biological control options are needed. Current practice is proceeding based on an inadequate research base, largely guided by guesswork and insectary recommendations.

Risk reduction benefits of project. Reduction of pesticide use in greenhouses will benefit greenhouse workers. Greenhouse workers are often minimum wage employees who are the least sophisticated in protecting themselves from contact with potentially damaging pesticides. Conversion to biological control will improve this situation. Also, greenhouse growers want their products to be seen by their customers as “green.” Use of biological control as much as possible will help growers convey that image.

Reason for doing the study. This study is needed as a complement to our past efforts to develop biological controls for other pests in greenhouse flower crops (whiteflies and thrips). These programs would be less likely to be implemented if pesticide controls for aphids were commonly used, disrupting biological control of other pests.

#### D. Objectives

Obj. 1. Aphid/Crop Survey in MA and NY Greenhouses. The goal of this objective is to determine which aphids, on which crops, are the dominant species found in MA and NY on spring flower crops. While this information is known in superficial terms, this survey will provide quantitative data, which are lacking.

Obj. 2. Assess the Efficacy of Banker Plants Systems for Biological Control of Aphids in Spring Flower Crops. We will assess the degree of aphid control provided by banker plants, examining the influences of aphid and plant species.

Obj. 3. Compatibility of Selective Aphicides and *A. colemani*. In the laboratory, we will measure the effect of pyrethrin and pyroxyfen on adults and mummies of *Aphidius colemani*.

Obj. 4. Efficacy under Commercial Greenhouse Conditions. After the previous work, we will examine the efficacy of *A. colemani* in commercial growers in MA and NY.

#### E. Approach

As a first activity, we will survey 40 greenhouses between NY and MA to determine what aphids are the dominant species. We expect to find that these will be cotton aphid and greenpeach aphid, but other species such as floxglove aphid may be important. Following the surveys, technicians in both MA and NY will go to Florida to be trained in aphid identification to work up the material found in the survey

The trial to measure efficacy of our banker plant system will be run in greenhouses at UMASS. Each test greenhouse will contain 60 flats (= 90 sq ft or 8.6 m<sup>2</sup>) of crop plants, of 1 or 2 plant species as called for in the design. The number of parasitoids released (*A. colemani*) will be chosen so that the treatment will be roughly cost-competitive with pesticides. *A. colemani* is sold by Koppert for \$22.50 per package of 500 parasitoids, or \$0.045 each. Approximately 50 parasitoids will be placed on one open rearing unit per greenhouse (2.5 x 4.5 m). Using mixtures of cotton and greenpeach aphids on pansies and margarita daisies, we determine the effects of (a) aphid species, (b) plant species, and (c) mixing of aphid species within the crop affect the level of control provided by *A. colemani* released via open rearing units (banker plants).

To assess the compatibility of potentially selective aphicides with *A. colemani*, we will assess the mortality of *A. colemani* in two life stages (adults of mixed sex or mummies) caused by contact with residues (for adult parasitoids) or direct sprays (for mummies) of both pymetrozine and pyriproxyfen.

In year 2 (2006) we will simultaneously conduct a trial of our banker plant system in commercial greenhouses in both MA and NY.

#### F. Progress

In the first year of the project, we have made the following progress.

1. Obj. 1 (aphid survey in commercial greenhouses). Forty greenhouses have been surveyed. Technicians from MA and NY have been trained in aphid identification by a specialist in Florida. Sorting of the species recovered is pending.
2. Obj. 2 (greenhouse trials at UMASS). Before the trial we needed to obtain aphid cultures such that both of the target aphids would feed on both of the intended test plant species. This was not possible for impatiens and geraniums. We were able to find cultures of melon and greenpeach aphids that did both feed on both pansies and margarita daisies. Using these aphids and test plants, the first UMASS greenhouse trial was begun in April of 2005 and will conclude in mid May. The second trial will follow immediately. Initial results show a strong effect of the presence of parasitoids vs the untreated control.
3. No work has yet been attempted on Objs 3 or 4. Work on Obj. 3 is planned for summer of 2005 and work on Obj 4 in commercial greenhouses will occur in spring of 2006.